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was derived, as Harris the historian states, from the following circumstance, which occurred in the year after. The apprentices of Dublin having assembled themselves riotously together with an intention to break down the bridge, it became necessary to call out the military to defeat their object, when twenty of the rioters were seized, and committed to the Castle. It happened, however, afterwards, that as a guard of soldiers were conveying these young men to the Bridewell, they were rescued by their fellows, and in the fray four of them were slain; "from which accident it took the name of Bloody Bridge." In a short time afterwards, this wooden structure gave place to the stone bridge we now see, which is of unadorned character, and consists of four semicircular arches. Its rude and antique appearance, however, harmonizes well with the military gateway placed at its southwestern extremity, on the road leading to the Royal Hospital at Kilmainham. This gateway, which was designed by the late eminent architect, Francis Johnston, Esq. P. R. H. A., and erected for government, under his superintendence, in 1811, consists of a square tower, having smaller square towers projecting from three of its angles, and a circular one of greater diameter and altitude at its fourth or north-eastern angle. The object for which this gateway tower was erected, as well as the period of its erection, is indicated by escutcheons on its east and west sides, bearing the arms of the Duke of Richmond and the Earl of Harrington, the lord-lieutenant and the commander of the forces of the time. A similar shield on its north side facing the river, sculptured with the armorial bearings of the family of Johnston, indicates the name of its architect; and it is worthy of mention as a characteristic of the love for posthumous fame of Mr Johnston, that this tablet was not known to exist till within a few years back, and after he had himself paid the debt of nature; having been concealed from view by a box of wood fastened against it, and which was suffered to remain—a strange mystery to the curious observer—till it fell off from decay. P.

ON THE IMPORTANCE OF ATTENDING TO THE QUALITIES OF SEED,

AND THE CONDITION OF THE SOIL IN THE SOWING SEASON.

BY MARTIN DOYLE.

AMONG the common Irish farmers, indifference to the quality of all seeds is still remarkable. Even in respect to wheat, that most valuable grain, stupidity and carelessness are observable, though the loss sustained in consequence, both in the quantity and quality of the produce, is very great. It is no doubt principally owing to the superiority of climate that wheat and other corn crops grown in the midland counties of England are so far superior to our grain productions; but much of the excellence which we perceive is attributable to the care taken in changing seed, and using that only which is really good. An English farmer will send his waggon a considerable distance for the seed which will best answer for his land, and he is willing to pay an advanced price for it, as he knows that his advantage will be proportional.

We do not import from the principal wheat counties of England a sufficient quantity of seed: degeneracy rapidly takes place in the quality of that which we do sow of imported grain, and on that account a regular and frequent change is necessary, and by the more economical distribution of this, the difference between the prices of home-grown and imported seed would be scarcely felt. Not that I would recommend, except in some of our most calcareous inland counties, those *white* varieties which flourish in Kent, or Suffolk, or Buckinghamshire, but the hardier red *Lammis* kinds which succeed well in us in general, but which require frequent renewal, else they become thick skinned and dark coloured, and consequently of inferior value to the miller. By substituting the drill system for the broad-cast in fit seasons, and on land perfectly suited to it, one part in four, certainly one in five, is saved, even by those who sow in the narrowest possible drills, and thickly.

I shall detail the mode by which the land is prepared for sowing, and the process of sowing, in Buckinghamshire, on clover ley, the most troublesome for the purpose:—

Farm-yard manure being spread upon the surface, wheel ploughs drawn by three powerful horses are set to work to plough the land in the usual British way. In wide lands or stitches, after the sod has been turned and laid at an angle

of forty-five degrees, the seed is sometimes then sown and harrowed down. But the neatest farmers, instead of sowing at this stage of the work, employ a compressing implement formed of two parallel metal wheels at one end of an axle, and very close to each other, and a guide wheel of the same diameter at the other end. The interior rims of the compressing wheels (or rollers) are four inches wide, and nearly touch each other; the exterior surfaces are narrowed to two inches; these wheels sink into the earth at the junctions of the furrow slices, and by pressing down the grassy edges, and forming perfect grooves at the intervals of seven or nine inches, the seed may be sown with extreme exactness, and without the loss of a single grain, and at a uniform depth. But though the seed is frequently sown with the preparation just stated, the practice of the neatest and most judicious farmers is to harrow down these drills after the rollers have formed and completed them, and then to sow with the Suffolk drill-machine in the free and pulverized surface. This implement forms and sows several shallow drills at each bout, and with perfect precision; the experienced eye of the man who follows in the rear, enabling him in an instant to perceive any possible irregularity in the movement of the hoppers and distribution of the seed.

The great advantage derived from the action of these compressing wheels is, that the grassy edges of the furrow slices are prevented altogether from vegetating by the depth to which they are removed from the surface, and that the pressure of the portions into which the rollers sink, is far more effective and consolidating than if an ordinary broad roller were to pass over the entire area. In preparing any loose fallow land for vetches, these compressing rollers are very serviceable. By following two ploughs, and in the same tracks, the ploughing and the perfect formation of the drills by pressure are accomplished in the same space of time, the two wheels obviously describing double the number of furrows described by each plough in the same period.

In heavy clay soils this compression is at least unnecessary, and in stony land drilling is difficult and unadvisable, but in light open soils the advantages of this system are considerable. The proper season for sowing is also a point of great consideration, both as regards the economy of seed of any kind, and the productiveness of the crop.

Some people labour to effect their seed-sowing on a particular day or week without other calculations, and are quite satisfied that all is well if the seed is in the ground at the precise time which they have appointed for the purpose. Now, any rule as to time alone is especially absurd in our variable climate; even in the midland counties of England, where extreme vicissitudes of weather are less frequent, it is injudicious to fix any certain rule as to the exact time for committing the various sorts of corn to the ground. Experience has taught those who have considered the subject, that it is unwise to force a season. For example, the middle of October is considered in Buckinghamshire to be the best time for sowing wheat; but the earth at that time may be so dry (and actually was so in the past year) as to be more fit for barley than wheat; or it may then be so wet as to be equally unfit for the reception of the seed. In either case the judicious farmer waits for the correct season, which experience has taught will have a corresponding harvest.

After a wet cold summer the light dry soils of that county being firm and consolidated, it is perhaps desirable to sow wheat at a very early period of the autumn; and after a hot dry summer, when the land is in a contrary condition, it would be better to wait for the autumnal rains to obtain a firm seed bed. Again, with barley on the same soil, the first of April is considered a good time; but the farmer who should persist in sowing just then in spite of the weather or the unprepared state of the land, would be a fool indeed, and would discover the effect of his blunder in the shortness of his crop. It is true that the superstitions of the ancients which so ridiculously influenced the affairs of husbandry, have long since ceased to be regarded. No one in these days would think it expedient to steep his seed in the juice of wild cucumbers; nor to bring it into contact with the horns of an ox, for luck; nor to cover the seed basket with the skin of a hyæna, to keep off by its odour the attacks of vermin; nor to sprinkle corn before sowing with water in which stags' horns or crabs had been immersed; nor to mix powdered cypress leaves between the seed—though pickles and solutions for destroying insects are not to be despised. Neither are the planetary influences now much respected; yet there are

many foolish old farmers who attach no little importance to the state of the moon, the dark nights in November being a favourite season, without the really important considerations that the earth and the weather are in an appropriate and congenial state.

I have stated that the drills formed by the Suffolk drill-machine are very shallow; they are merely sufficient to afford about an inch of covering to the grain; but I have been assured by the best judges that the natural tendency of the cereal grains to strike their fibres is such that a heavy covering is unnecessary. Our national opinion is in favour of a heavy covering, and our wheat especially is actually imbedded deeply in the ground with a plough.

The practice in Great Britain universally is to harrow in the grain. The same practice is universally prevalent in France, where the land is left roughly harrowed (in the case of winter wheat), in order that the mouldering of the clods in spring may afford a kind of earthing to the plants, and prevent the running together of the earth in the wet winter months, as is too frequent on tenacious soils too finely harrowed.

It is not very long since the advantage of compressing the soil, for wheat in particular, was discovered in Buckinghamshire, by the accidental circumstance of a roller (which had been used for some different purpose) having been drawn in a zig-zag direction across a wheat field. The plants tillered better, looked far more vigorous during their advance to maturity, and yielded a far better return on the part of the field so distinguished by the course of the rollers, which soon after became a favourite implement in the culture of grain crops.

There is no doubt that all seeds are frequently sown with wasteful prodigality, because they are cheap or indifferent in quality. How much better then is it to have those of superior quality, though at a higher price, and to encourage the distribution of them in the soil by a careful mode of sowing!

Grains of corn of superior excellence are frequently selected with great care, as by Colonel le Couteur, in Jersey, and then sown with a dibble in seedling beds. The plants thus carefully treated tiller surprisingly, and produce accordingly; after two or three seasons, a fine variety, or a renovation of some previously established one, is obtained, and the seed is anxiously sought for.

Do any of our farmers ever dream of going through their corn fields in harvest, and thus obtain choice seeds? And yet what is there to prevent success in this respect? A poor farmer who cannot afford to purchase celebrated varieties at a high cost, may become his own seedsman, by care and assiduity, in an incredibly short time. Let some of our readers make the desired experiments for their own sakes.

SUSPENSION BRIDGES.

On the Theory of Suspension Bridges, with some account of their early history. By Mr G. F. FORDHAM. Read at the Scientific Society, March 12, 1840.

SUSPENSION BRIDGES appear to be of very ancient origin: travellers have discovered their existence in South America, in China, in Thibet, and in the Indian peninsula. They are most frequently met with in mountainous regions, and being suspended across a deep ravine, or an impetuous torrent, permit the passage of the traveller where the construction of any other kind of bridge would be entirely impracticable. Humboldt informs us that in South America there are numerous bridges of this kind formed of ropes made from the fibrous parts of the roots of the American agavey (*Agave Americana*). These ropes, which are three or four inches in diameter, are attached on each bank to a clumsy framework composed of the trunk of the *Schinus molle*; where, however, the banks are flat and low, this framework raises the bridge so much above the ground as to prevent it from being accessible. To remedy this inconvenience, steps or ladders are in these cases placed at each extremity of the bridge, by ascending which all who wish to pass over readily reach the roadway. The roadway is formed by covering the ropes transversely with small cylindrical pieces of bamboo. The bridge of Penipé erected over the Chamboo is described as being 120 feet long and 8 feet broad, but there are others which have much larger dimensions. A bridge of this kind will generally remain in good condition 20 or 25 years, though some of the ropes require renewing every 8 or 10 years. It is worthy of remark, as evincing the high antiquity of these structures, that they are known to have existed in South America long

prior to the arrival of Europeans. The utility of these bridges in mountainous countries is placed in a striking point of view by the fact mentioned by Humboldt, of a permanent communication having been established between Quito and Lima, by means of a rope bridge of extraordinary length, after 40,000^l had been expended in a fruitless attempt to build a stone bridge over a torrent which rushes from the Cordilleras or the Andes. Over this bridge of ropes, which is erected near Santa, travellers with loaded mules can pass in safety.

But suspension bridges composed of stronger and more durable materials than the twisted fibres and tendrils of plants, are found to exist in these remote and semi-barbarous regions; in Thibet, as well as in China, many iron suspension bridges have been discovered, and it is no improbable conjecture that in countries so little known and visited by Europeans, others may exist, of which we have as yet received no accounts. The most remarkable bridge of this kind of which we have any knowledge in Thibet, is the bridge of Chuka-cha-zum, stretched over the Tehintchiew river, and situated about 18 miles from Murichom. Turner, in his Embassy to the Court of Thibet, says, "Only one horse is admitted to go over it at a time: it swings as you tread upon it, re-acting at the same time with a force that impels you every step you take to quicken your pace. It may be necessary to say, in explanation of its construction, that on the five chains which support the platform, are placed several layers of strong coarse mats of bamboo, loosely put down, so as to play with the swing of the bridge; and that a fence on each side contributes to the security of the passenger." The date of the erection of this bridge is unknown to the inhabitants of the country, and they even ascribe to it a fabulous origin. The length of this bridge appears to be about 150 feet.

Turner describes in the following terms a bridge for foot passengers of an extraordinary construction. "It was composed of two chains stretched parallel to each other across the river, distant four feet from each other, and on either side resting upon a pile of stones, raised upon each bank about eight feet high; they were carried down with an easy slope and buried in the rock, where, being fastened round a large stone, they were confined by a quantity of broken rock heaped upon them. A plank about eight inches broad hung longitudinally suspended across the river by means of roots and creepers wound over the chains with a slackness sufficient to allow the centre to sink to the depth of four feet below the chains. This bridge, called Selo-cha-zum, measured, from one side of the water to the other, 70 feet. The creepers are changed annually, and the planks are all loose; so that if the creepers give way in any part, they can be removed, and the particular part repaired without disturbing the whole."

Numerous suspension bridges formed of iron chains exist also in China; and though the accounts which travellers have transmitted respecting them are less detailed and explicit than would have been desirable, descriptions of two of them have been furnished, which are sufficiently minute and intelligible to excite considerable interest. The first to which I refer is contained in Kieffer's China Illustrata. The following is a translation of the author's words: "In the province of Junnan, over a valley of great depth, and through which a torrent of water runs with great force and rapidity, a bridge is to be seen, said to have been built by the Emperor Mingus, of the family of the Hamæ, in the year of Christ 65, not constructed of brickwork, or of blocks of stone cemented together, but of chains of beaten iron and hooks, so secured to rings from both sides of the chasm, that it forms a bridge by planks placed upon them. There are 20 chains, each of which is 20 perches or 300 palms in length. When many persons pass over together, the bridge vibrates to and fro, affecting them with horror and giddiness, lest whilst passing it should be struck with ruin. It is impossible to admire sufficiently the dexterity of the architect Sinensius, who had the hardihood to attempt a work so arduous, and so conducive to the convenience of travelling." Another suspension bridge in this country is described in the 6th vol. of the "Histoire Generale des Voyages." The following is a translation: "The famous Iron Bridge (such is the name given to it) at Quay-Cheu, on the road to Yun-Nan (Junnan?) is the work of an ancient Chinese general. On the banks of the Pan-Ho, a torrent of inconsiderable breadth, but of great depth, a large gateway has been formed between two massive pillars, 6 or 7 feet broad, and from 17 to 18 feet in height. From the two pillars of the east depend four chains attached to large rings, which extend to the two pillars of the west, and